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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/229,898	01/14/99	ROWE S	1263.0700

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EXAMINER	
SEALEY, L	
ART UNIT	PAPER NUMBER
2671	

DATE MAILED: 08/29/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No.	Applicant(s)	
	09/229,898	ROWE ET AL.	
	Examiner	Art Unit	
	Lance W. Sealey	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 January 1999* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-248* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-54,56-63,65-116,118-129,131-165,237-238 and 240-243* is/are allowed.

6)☒ Claim(s) *55,166,170-179,183-195,197-207,209-215,218-227,230-236,239 and 244-248* is/are rejected.

7)☒ Claim(s) *16,167-169, 180-182, 196,208,216-217 and 228-229* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *6-9* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Notice of Change in Art Unit

1. The Group and/or Art Unit location of your application in the USPTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Group Art Unit 2671.

Allowable Subject Matter

2. Claims 1-54, 56-63, 65-116, 118-129, 131-165, 237 and 240-243 are allowed.

3. The following is a statement of reasons for the indication of allowable subject matter: The rendering of a schematic of the positions of the objects of the scene when the selected viewing direction is not within the predetermined range of viewing directions (claims 116, 129, 130, 177, 203, 241-242 and 246); comparing the height of the representation of each object generated in dependence upon image data and generating object representations in the 3D computer model in dependence upon the height comparisons (claims 1, 21, 23, 40 and 237); defining a model of the object in the 3D computer model in dependence on a determined ground footprint (claims 67, 84, 85, 99 and 240); a second camera processing image data from a first camera, determining which image data is an object and which data is the object's shadow (claims 54, 63); defining a model of the object in the 3D computer model in dependence upon identified planar surfaces (claims 133, 149, 150, 163, 243); and applying a transformation to the identified image data from a camera which defines a mapping from the ground plane in the space of the image data of the camera to a

surface in a modeling space (claims 44, 56, 238).

4. Claims 2-20 and 42-43 are allowed because they depend, directly or indirectly, on claim 1; claims 24-39 are allowed because they depend, directly or indirectly, on claim 23; claims 45-53 and 65-66 are allowed because they depend, directly or indirectly, on claim 44; claims 57-62 are allowed because they depend, directly or indirectly, on claim 56; claim 68-83 and 100-101 are allowed because they depend, directly or indirectly, on claim 67; claims 86-98 are allowed because they depend, directly or indirectly, on claim 85; claims 103-115 and 131-132 are allowed because they depend, directly or indirectly, on claim 102; claim 119-128 because they depend, directly or indirectly, on claim 118; claims 134-148 and 164-165 are allowed because they depend, directly or indirectly, on claim 133; claims 151-162 are allowed because they depend, directly or indirectly, on claim 150.

5. Claims 16, 167-169, 180, 196, 208 and 216-217 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter: No prior art anticipates or suggests adjusting the effective light value of a light source in a virtual set patterned after a physical set to account for attenuation of each light source due to an angle between an optical axis of each light source and a line between each light source and the computer animated object (claim 16); generating information indicating the reliability of the image

data in dependence upon the angle between the user-selected viewing direction and the viewing direction upon which the image data was recorded (claims 167 and 180); consideration of the camera characteristics affecting quality in a predetermined order and values for each respective camera characteristic compared, with the determination of the representations to be rendered being made once the tests identify a characteristic which differs by more than a predetermined amount for given cameras (claims 196 and 208); image data for an object in a second image in a sequence is generated by rendering texture data based on image data from the first camera onto the first representation of the object in accordance with the second user-selected viewing direction (claims 216 and 228). Claims 168-169 and 181-182 are allowable because they depend on claim 167 and 180, respectively. Claims 217 and 229 are allowable because they depend on allowable claims 216 and 228.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 166, 170-173, 175, 177, 179, 183-187, 189-195, 197, 199, 201, 203-207, 209,

212-213 and 244-246 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marks (U.S. Pat. No. 6,025,847) in view of Diner et al. ("Diner," U.S. Pat. No. 5,182,641) and Goldberg et al. ("Goldberg," U.S. Pat. No. 5,877,779).

9. With respect to claims 166, 177, 179, 187, 193-194 and 205-206, Marks, in disclosing a 3D modeling system with visual feedback, also discloses a method of processing image data defining a sequence of images of at least one object moving in a scene to produce signals defining a representation of each object in a 3D computer model, and to generate image data by rendering an image of the 3D computer model, the method comprising processing the image data to identify image data relating to respective objects in the scene (Abstract, fourth and fifth sentences) and defining a representation of each object in the 3D computer model in dependence upon the identified image data (Abstract, fourth and fifth sentences).

10. However, Marks does not disclose generating image data by rendering an image of the 3D computer model in accordance with a user-selected viewing direction or quality information. The generation of image data is disclosed by claim 18 of the Diner composite video and graphics display for camera viewing systems in robotics and teleoperation, col.12, ll.33-57, and the quality information is disclosed by Diner at col.1, ll.31-41.

11. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to use the Diner system for real-time video display in the Marks modeling

system. This would save time for the user of the system by eliminating any need to move the cameras again once they have been initially set to view all locations of the workspace.

12. However, neither Marks nor Diner disclose rendering texture data based on the identified image data onto the object representations. This is disclosed by the Goldberg method and apparatus for efficient rendering of 3D scenes at col.2, ll.5-11.

13. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to incorporate the Goldberg rendering method in the Marks modeling system. This would greatly increase the efficiency and throughput of graphics data in the rendering pipeline.

14. The remainder of the claims in this rejection will now be considered: With respect to claims 170 and 183, Diner discloses more than one camera in col.1, ll.14-23, Marks discloses identifying image data from a camera relating to respective objects in the scene and defining a representation of each object in dependence upon the identified image data from the camera at col.6, ll.42-48, and Goldberg discloses rendering texture data based on the identified image data from at least one camera onto the object representations in col.2, ll.5-11.

15. Concerning claims 171 and 184, Marks discloses each object represented as a planar surface (implied by col.6, ll.39-41).

16. Regarding claims 172 and 185, Diner discloses quality information generated as pixel data within the generated image data (implied by col.1, ll.31-41; it is well known that color is expressed in video graphics systems in pixels).

17. With respect to claims 173 and 197, Diner discloses generating a signal conveying the image data and the quality information (also implied by col.1, ll.31-41; it is well known that a signal needs to be generated in order to initiate and sustain a video graphics system).

18. Concerning claims 175, 186, 199 and 209, Marks discloses displaying an image using the generated image data and displaying the quality information in the third sentence of the Abstract.

19. Regarding claims 189 and 212, Marks discloses a storage medium storing instructions for causing a programmable processing apparatus to perform a method (memory device **104**, FIG.1).

20. With respect to claims 190 and 213, Marks discloses a signal conveying instructions for causing a programmable processing apparatus to perform a method (implied by computer **100**, FIG.1).

21. Concerning claims 191, 203 and 246, Diner discloses the representation of each object rendered is determined in dependence upon the user-selected viewing direction, the respective viewing directions of cameras, and at least one camera characteristic affecting image data quality at col.1, ll.31-41.

22. Regarding claims 192 and 204, Diner discloses the representation of each object rendered as being dependent upon the user-selected viewing direction, the viewing direction of respective cameras, and the resolution of respective cameras (col.14, ll.24-30).

23. With respect to claims 195 and 207, Diner discloses a plurality of camera characteristics affecting image quality considered to determine the representation of each object for rendering at col.1, ll.31-41 (color and brightness).

24. Concerning claim 201, Goldberg discloses the selection of a representation of each object at col.1, l.66 to col.2, l.1.

25. Therefore, in view of the foregoing, claims 166, 170-173, 175, 177, 179, 183-187, 189-195, 197, 199, 201, 203-207, 209, 212-213 and 244-246 are rejected as being unpatentable under 35 U.S.C. 103 by Marks, Diner and Goldberg.

26. Claim 174, 176, 198 and 200 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marks, Diner and Goldberg and further in view of the Sharp Corporation's Model VC-5W20E Video Cassette Recorder ("the Sharp VCR").

27. Neither Marks, Diner nor Goldberg disclose recording the signal conveying the image data and the quality information. However, this is disclosed by the Sharp VCR at page 15.

28. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to incorporate a VCR into the Marks-Diner-Goldberg 3D modeling system. This would preserve the image data for later use.

29. Accordingly, in view of the foregoing, claims 174, 176, 198 and 200 are rejected as being unpatentable under 35 U.S.C. 103 by Marks, Diner, Goldberg and the Sharp VCR.

30. Claims 178 and 188 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marks and Diner according to the same rationale as claim 166; the quality information is implicitly indicated by its presence in a way similar to the way it is indicated at col.1, ll.31-41 of Diner.

31. Claim 202 and 210-211 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marks, Diner and Petruchik (U.S. Pat. No. 5,587,752).

32. With respect to all three claims, neither Marks nor Diner disclose selecting image data to be used to define the object from a plurality of images of the object each recorded by a specific camera. This element is disclosed in the Petruchik camera, system and method for producing a composite photographic image at col.10, l.65-col.11, l.2.

33. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to incorporate the Petruchik method into the Marks-Diner 3D modeling system. This would provide improved focus and exposure balance on an object.

34. Accordingly, in view of the foregoing, claims 202 and 210-211 are rejected as being unpatentable under 35 U.S.C. 103 by Marks, Diner and Petruchik.

35. Claims 214-215, 218-219, 221, 223-227, 230-236, and 247-248 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marks, Diner, Goldberg and Petruchik and further in

view of applicant's admitted prior art Haralick et al., Computer and Robot Vision Volume 2 ("Haralick"), and Wolberg, Digital Image Warping.

36. With respect to claims 214, 218, 223-226, 232-234 and 247-248, neither Marks, Diner, Goldberg nor Petruchik disclose testing whether first and second images of the object displayed from the generated image data will be discontinuous by testing whether the image data for the object in the second image in the sequence differs by more than a predetermined amount from predetermined image data. But according to p.49, ll.3-6 of this application's specification, which refers to p.48, ll.12-19, this element is disclosed by Haralick.

37. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to incorporate the Haralick method into the Marks-Diner-Goldberg-Petrucik 3D modeling system. This would facilitate the diagnosis of the problem of discontinuous images by enabling comparison of the images to find out how similar they are.

38. Neither Marks, Diner, Goldberg, Petruchik nor Haralick disclose generating modified image data for the object in the second image if the image data for the object in the second image differs by more than the predetermined amount. But according to p.49, ll.8-17 of this application's specification, this element is disclosed by Wolberg.

39. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to incorporate the Wolberg method into the Marks-Diner-Goldberg-Petrucik-Haralick 3D modeling system. This would enhance clarity of the image by eliminating

discontinuity in the image.

40. The rest of the claims in this rejection will now be considered: With respect to claims 215 and 227, Goldberg discloses rendering a representation of an object at col.1, l.66 to col.2, l.1.

41. Claims 219, 221 and 231 are rejected with the same rationale as claim 173. Claim 235 is rejected with the same rationale as claim 189. Claim 236 is rejected with the same rationale as claim 190.

42. Therefore, in view of the foregoing, claims 214-215, 218-219, 221, 223-227, 230-236 and 247-248 are rejected as being unpatentable under 35 U.S.C. 103 by Marks, Diner, Goldberg, Petruchik, Haralick and Wolberg.

43. Claims 220 and 222 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marks, Diner, Goldberg, Petruchik, Haralick and Wolberg and further in view of the Sharp VCR according to the same rationale used to reject claim 175.

Claim Rejections - 35 USC § 102

44. The following is a quotation of 35 U.S.C. 102(b) which forms the basis for all novelty-related rejections set forth in this Office action:

> A person shall be entitled to a patent unless—
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or sale in this country, more than one year prior to the date of application for patent in the United States.

45. Claims 178 and 188 are rejected under 35 U.S.C. 102(b) as being anticipated by Diner.

46. With respect to both claims, Diner discloses generating image data by rendering an image of the 3D computer model in accordance with a user-selected viewing direction or quality information. The generation of image data is disclosed by claim 18 of the Diner composite video and graphics display for camera viewing systems in robotics and teleoperation, col.12, ll.33-57, and the quality information is disclosed by Diner at col.1, ll.31-41.

47. Therefore, in view of the foregoing, claims 178 and 188 are rejected as being anticipated by 35 U.S.C. 102(b) by Diner.

48. The following is a quotation of 35 U.S.C. 102(e) which forms the basis for all novelty-related rejections set forth in this Office action:

> A person shall be entitled to a patent unless—
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by applicant for patent.

49. Claims 55 and 239 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsao (U.S. Pat. No. 5,911,035).

50. Tsao, in disclosing a method and apparatus for determining binocular affine disparity and affine invariant distance between two image patterns, also discloses, with respect to both claims, a method of generating a model of an object in a 3D computer model in which a transformation is applied to image data from a camera relating to the object and its shadow which maps the image data for one of the object and its shadow to a surface (col.3, ll.8-15. The transformation is applied to image data relating to object mapping image data. Since col.8, ll.41-63 discloses two

cameras, it would be obvious to apply this same transformation to data from a second camera.) Tsao also discloses modelling the object in dependence upon part of the transformed image data at col.2, ll.63-66.

51. Therefore, in view of the foregoing, claims 55 and 239 are rejected as being anticipated under 35 U.S.C. 102(e) by Tsao.

Conclusion

52. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lance Sealey whose telephone number is (703) 305-0026. The examiner can normally be reached Monday-Friday from 7:00 am to 3:30 pm EDT.

53. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman, can be reached on (703) 305-9798. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314.

54. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4700 or the Customer Service Office at (703) 306-0377.

MARK ZIMMERMAN
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TECHNOLOGY CENTER 2600